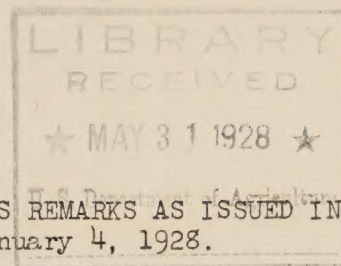


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STATEMENT OF DR. HEADLEE TO BE SUBSTITUTED FOR HIS REMARKS AS ISSUED IN  
MINUTES OF CODLING MOTH CONFERENCE, January 4, 1928.

Through some oversight the shorthand synopsis of Dr. Headlee's remarks on the codling moth conference in Washington, held in January, failed to meet his attention until recently. Dr. Headlee requests that those receiving copies of the minutes will substitute for his statement in the minutes as issued, the statement sent herewith. There is also attached copy of New Jersey Experiment Station Circular 209 (February 1928) on "Spraying and Dusting Recommendations for Apples," in which detailed information is given on current recommendations for codling moth control in New Jersey.





Dr. Headlee:

We have had a great deal of experience in fighting codling moth. There is little benefit in reviewing such experience, except in so far as such review may bring out conclusions that serve as a basis for future action.

On the question of the relative value of banding, it may be said that we have had experience during each of the last two years with about 50,000 bands and that, as a result of this experience, we consider the practice of banding as a valuable adjunct in codling moth control on trees that are large, rough-barked and studded with pruning scars. The relative value of banding and spraying is well-illustrated in the following examples: - In the season of 1926 one orchardist scraped his trees thoroughly, banded them with burlap and attended to these bands conscientiously. His spraying was poorly timed and incompletely done. On a large block of old fashioned Winesaps he averaged 5 worm holes per apple. In 1926 another orchardist had an open shed in which he had stored something like 28,000 used baskets. This shed stood within about 75 feet of the edge of one of his orchards. He maintained a very thorough film coating of the trees on the first ten rows nearest to this shed throughout the period of first brood codling moth larval entrance. Although enormous numbers of codling moths of the overwintered generation emerged from this shed he was able to pick at the end of the season 30% of the fruit of these ten rows absolutely free from all codling moth injury.

We look upon banding as a method of bringing the codling moth population on old, large, rough-barked, pruning scar studded apple trees to approximately the same point where it is on young smooth-barked trees. We do not feel that, even with the best banding practice, the codling moth population of the old orchard can be brought to quite as low a point as it is on the young smooth-barked bearing trees, without the use of any bands whatever.

The time and the method of spray applications are matters of enormous importance. We make no change in the ordinary practice for the blossom fall application because the results of this application during the last decade and a half have been very satisfactory from the standpoint of preventing blossom end worminess.

We do insist, however: (1) that the material employed shall include 3 pounds of powdered lead arsenate or its equivalent to 100 gallons of spray and, when the cover sprays arrive, this amount of lead arsenate shall be increased to 4 pounds, and that there shall be included a good spreader and stick-er, such as casein lime or powdered sweet skim milk at the rate of 3 pounds to 100 gallons of spray; (2) that the first cover spray be administered as soon as one-half of the overwintering generation of moths has emerged from pupae, and that the cover thus established be maintained throughout the period of entry by codling moth larvae of the first brood; (3) that these cover sprays shall be applied in such a fashion as to effect a film coating over both sides of the leaves and all sides of the apple.







In obtaining the complete coating mentioned it has been found necessary, when spraying a tree in full foliage, to spray it thoroughly from beneath as well as from the outside. We are inclined to think that the mastery of this "under spray system," as this procedure has been called, has proven the most important point in the spraying methods necessary to obtain control of codling moth under heavy infestation conditions.

We believe, in general, that if the cover sprays against the first brood of codling moth larvae are properly and completely carried out there exists little reason for the utilization either of a blossom fall or second brood cover sprays. During 1926 and 1927 there were blocks in the Glassboro district to which no blossom fall arsenic was applied but on which very thorough coating of lead arsenate was maintained during the entire period of entry by codling moth larvae of the first brood and the infestation on these blocks was no greater than that on the blocks which had received arsenic at the blossom fall. Our experience shows that maintaining the coating of lead arsenate on the fruit and foliage during the period of entry by codling moth larvae of the second brood gives not to exceed a 15% reduction in fruit injury and, in most cases, materially less.

Our method of timing the cover sprays may be of interest to you. For more than six years we have been using the codling moth emergence box for this purpose. When half of the viable overwintering codling moth has emerged in these boxes, we advise prompt application of the first cover spray. The difficulty with this practice has been the time required to gather the larvae and the time required to determine the emergence. Hence we have never been able to carry efficiently a very large number of stations. This has led us to look for methods by means of which we could maintain a large number of stations and afford a more widespread and reliable spray service. We have checked the codling moth bait pans for this purpose and find to a minor degree the same difficulty in the matter of expense as obtained in the cost of the codling moth emergence box. Furthermore, the codling moth bait pan curve affords no very clear-cut indication of the time when approximately half of the viable overwintering generation has emerged.

Glenn's work on the thermal constant of the codling moth attracted our attention and led us to seek for the desired indicator in that direction. Our studies have led us to conclude that the thermal constant of the codling moth is a good indicator for time of spray because by its use we can determine when approximately half of the viable overwintered generation has emerged and when emergence of that generation has ceased. By its use we can also determine when approximately half of the emergence of the first summer generation will occur and when it will cease. Past experience has shown, with Hessian fly and possibly with other insects, that other factors, climatic or otherwise, may enter and make the thermal constant indicator uncertain. To meet this uncertainty we have adopted the plan of establishing a set of ten codling moth bait pans at each temperature accumulation station, of which we expect to have in the neighborhood of 35-40 in the season of 1928. The thermal constants, which we expect to use for the beginning and end of the cover sprays for each of the two broods, are set forth in a paper presented to the Entomological Society of America at the Nashville meetings.







We believe that concentration of the fight against the codling moth on the effort to destroy the entering larvae of the first generation will go far, under our climatic conditions, toward keeping the charge of arsenic on the late fruit at picking time within the required tolerance. Our opinion in this matter is based upon chemical analyses made in orchards with a well known spray schedule practice during the season of 1927.

Early fruit, of course, treated in this fashion would, undoubtedly, carry too much arsenic. We, therefore, propose that all liquid spray applications shall cease on the early fruit with the 17-day after blossom fall spray, and that the cover treatments against the first brood of codling moth larvae shall be made with sulfo-arsenical dusts. Our experience indicates that the required coating with sulfo-arsenical dust can best be maintained by weekly applications beginning at the time of the first cover spray and following throughout the period of entry. The first treatment is given from one side and the second treatment follows one week later from the other side. These applications should be made when the air is still and the dew is on the foliage.

In dealing with the codling moth control in the various regions of New Jersey, we believe that one cover spray for first brood larvae on late fruit will give satisfactory results in the northern part of the state; that two cover sprays will be ample in the central portion of the state, and that three may very well be required in the southern portion of the state. In cases of extremely heavy infestation, dusting or even spraying for second brood may be necessary.

It may be apropos to point out that the above methods intelligently used have been effective, as indicated by the following figures. In Glassboro, N. J., area on a set of twelve properties, aggregating between 1,400 and 1,500 acres of bearing fruit, in 1925 the picked fruit showed not more than 50% free from codling moth injury. In 1926, when these methods were put in operation, 68.8% of the picked fruit was free from codling moth injury, and in 1927, during which year the same methods were continued, 82.1% of the picked fruit was free from codling moth injury.

Dr. Harry McLean of our Station has been making a study of spray residue removal from late fruit and finds that, while it is more difficult to remove the residues from fruit in storage than from fruit just brought in from the orchard, it can be removed in either case. He finds, however, difficulty in getting the residue on some of the varieties sufficiently below .01 grams per pound to render it absolutely certain that the fruit thus treated may not show some specimens with a little higher amount of residue than that. It seems to us, in view of this fact and in view of our lack of knowledge of the removal of spray residue on early fruit, that the domestic tolerance for the 1928 crop should allow a bit more latitude than is now proposed.

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